

REMARKS

Consideration of this application is respectfully requested in view of the foregoing amendments and the following remarks.

Preliminary Matters

Applicants would like to thank Examiner Nguyen for his time and courtesy during the personal interview conducted on December 14, 2004. The issues discussed during the personal interview included the weighting concept of the invention and the assignment of a lighter amount of weight to the starting and ending time of the counting period. The following considerations reiterate, and elaborate upon, the issues discussed during the personal interview.

Summary of the Response

By foregoing Amendment, new claim 8 has been added. No new matter has been added. Thus, claims 1-8 are currently pending in this application and subject to examination.

In the Office Action mailed on October 7, 2004, claims 1-7 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Claims 1-7 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,095,264 to Hulsing. Applicants hereby traverse the rejections, as follows.

Claims 1-8 Are Enabled

With respect to claims 1-7, in response to the Examiner's specific requests for clarification of the feature of claim 1 of a "frequency measurement unit counts the reference clock by using a lighter amount of weighting to each count at a starting time and an ending time of the counting period" and for clarification of the designation "weighting values of weight assigning wave number measurement circuit" in Figure 7 and the relationship among the numbers 0, 1 and 2, Applicants respectfully present the following considerations.

As illustrated by the arrows in Figures 7 and 12, a possible count error may occur at the starting count and ending count of the counting period. Assuming the situation where the phases of the input signal C_{in} and the reference clock C_b accidentally match at the starting count time and the ending count time, the reference clock wave number measurement circuit 3 of Figure 11 may or may not count the first edge of the reference clock C_b and the last edge of the reference clock C_b . As shown in Figure 11, the reference clock C_b is provided to the measurement circuit 3 as the selector output S_2 via the selector circuit 2. If the measurement circuit 3 does not count both of the first and last edges, then the counted number will be $N-1$. If the measurement circuit 3 counts both of the first and last edges, then the counted number will be $N+1$. To solve this problem, the measurement circuit of the present invention assigns a lighter amount of weight to each count at a starting time and an ending time of the counting period, as recited in claim 1. Because of the assignment of the lighter weighting to the starting time and ending time, the error can be minimized.

Referring to figure 7, the counting period is from t_0 to t_{M+1} and is also designated as the "Output of the Weight Assigning Wave Number Measurement Circuit." The cycles before t_0 and after t_{M+1} (e.g., cycles 0 and $M+2$) are assigned a weight of 0, as they are not part of the counting period. The first and last cycles of the counting period (e.g., cycles 1 and $M+1$) are assigned a weight of 1, and all of the remaining cycles in the counting period (e.g., cycles 2 through M) are assigned a weight of 2. The illustrated numbers 0, 1 and 2 are only examples of the amount of weighting. Other examples of the amount of weighting may be found in expressions (1), (2) and (3) on page 23 of the specification. Thus, language of claim 1 of "using a lighter amount of weighting" refers to the weight of 1 assigned to cycles 1 and $M+1$, while the remaining cycles in the counting period (cycles 2 through M in this example) are assigned a weight of 2. Applicants point the Examiner to pages 20 to 24 of the specification, where an extended explanation of the above considerations may be found.

Based on the above considerations, Applicants submit that claims 1-7 are enabled and respectfully request withdrawal of the rejection under 35 U.S.C. § 112. If any additional concerns exist, the Examiner is requested to contact the undersigned representative.

Claims 1 and 8 Recite Patentable Subject Matter

With respect to claim 1, Applicants submit that Hulsing, as shown in Figure 3, discloses a dual-edge frequency counter and method for minimizing the effects of duty cycle modulation. The dual-edge counter includes a first counter that accumulates reference clock pulses between successive rising edges of an input signal. An input

signal is also applied to an inverter that inverts the square wave signal prior to applying it to a second counter that also accumulates reference clock cycles between successive rising edges of the inverted sensor signal. A summation junction totals the accumulated counts from the first and second counters so that they can be averaged by a divider, which divides the total count by two. The frequency counter may also include an integer counter for totaling the number of cycles of the sensor signal occurring during a sample time defined by successive gate signals. The integer count, N , is then corrected for the compensated average of partial periods of the signal occurring at the beginning and the end of the sample time. The compensated average partial period corrects for variations in the sensor signal duty cycle.

It is respectfully submitted, however, that nothing in Hulsing discloses or suggests at least the feature of a "frequency measurement unit for counting a reference clock during a counting period having a predetermined number of waves of the input signal, wherein the frequency measurement unit counts the reference clock by using a lighter amount of weighting to each count at a starting time and an ending time of the counting period, than the amount of weighting at the other times of the counting period," as recited in claim 1 of the present application.

Furthermore, Applicants respectfully submit that nothing in Hulsing discloses or suggests at least the feature of a "weight assigning wave number measurement circuit for assigning a weight to each count in the counting period; wherein the weight assigning wave number measurement circuit assigns a lighter weight to a count at a starting time and an ending time of the counting period, compared to the weights

assigned to counts at all other times of the counting period,” as recited in new claim 8 of the present application.

For at least these reasons, the Applicants submit that claims 1 and 8 are allowable over the cited prior art.

Claims 2-7 Recite Patentable Subject Matter

As claim 1 is allowable, Applicants submit that claims 2-7, each of which depends from allowable claims 1, are likewise allowable over the cited prior art.

Conclusion

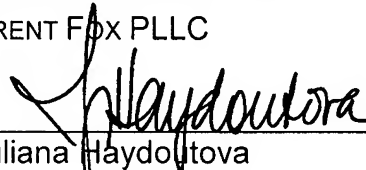
For all of the above reasons, it is respectfully submitted that the claims now pending patentably distinguish the present invention from the cited references. Accordingly, reconsideration and withdrawal of the outstanding rejections and an issuance of a Notice of Allowance are earnestly solicited.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is encouraged to telephone the undersigned representative at the number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300, referring to client-matter number 108066-00102.

Respectfully submitted,

ARENT FOX PLLC



Juliana Haydoutova

Registration No.: 43,313

Customer No.: **004372**

ARENT FOX PLLC

1050 Connecticut Avenue, N.W., Suite 400

Washington, D.C. 20036-5339

Tel.: 202-715-8469

Fax: 202-857-6395

JH:ksm

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